Accelerating Infrastructure Innovations

FOCUS

March 2002

INSIDE

New Asphalt Temperature Prediction Standard Adopted

A new asphalt pavement temperature prediction standard developed through the Long-Term Pavement Performance (LTPP) program has been adopted by the American Association of State Highway and Transportation Officials (AASHTO) Subcommittee on Materials. The standard provides an improved method for predicting the temperature within the asphalt layers of a pavement, using readily available data such as the infrared pavement surface temperature collected during routine deflection testing, the average air temperature the day before testing, and the time of testing.

Being able to accurately predict the pavement temperature and its effect on the deflection testing is important, as deflection testing is used to evaluate such pavement characteristics as axle or vehicle load capacity, structural life, and uniformity. To effectively analyze the data collected, the deflection results must be adjusted to account for both seasonal and temperature variations. Along with the temperature prediction method, the LTPP program has developed procedures for adjusting the deflection data for temperature. Applying these procedures allows data collected under varying temperature conditions to be compared and used interchangeably.

The standard provides an improved method for predicting the temperature within the asphalt layers of a pavement.

The new AASHTO standard, entitled *Prediction of Asphalt-Bound Pavement Layer Temperatures* (No. T317-02), will be published in the 22nd edition of AASHTO's *Standard Specifications for Transportation Materials and Methods of Sampling and Testing*. The new edition is due out in August 2002. For more information, contact the AASHTO Publications Order Department at 1-800-231-3475 (Web: www.transportation.org/publications/bookstore.nsf). The temperature prediction and data adjustment procedures developed by the LTPP program can be found in the report, *Temperature Predictions and Adjustment Factors for Asphalt Pavements* (Publication No. FHWA-RD-98-085). The report is available on the LTPP Web site at www.tfhrc.gov/pavement/ltpp/reports.htm. It can also be obtained from the Federal Highway Administration (FHWA) Research and Technology Report Center at 301-577-0818 (fax: 301-577-1421).

For more information, contact Cheryl Richter at FHWA, 202-493-3148 (email: cheryl.richter@fhwa.dot.gov).

U.S. Department of Transportation
Federal Highway Administration

"DC Streets" is a Capital Success

For Washington, DC, drivers, the ride is looking and feeling smoother. Launched with fanfare in June 2000, the "DC Streets" initiative constituted the first urban, performance-based asset management project in the United States. The District of Columbia Division of Transportation (DDOT) and the Federal Highway Administration (FHWA) and its engineering services consultant, Science Applications International Corporation (SAIC), worked together to develop the project. DDOT then awarded a contract to a private firm, VMS, Inc., to preserve and maintain approximately 121 km (75 mi) of the major streets and highways in the District. These roads make up the District's portion of the National Highway System (NHS) and are heavily used by residents, commuters, and tourists. A recent assessment of the first year of the project showed that substantial progress has been made toward meeting the contract's performance measures.

Assets that are being maintained under the 5-year, $70 million experimental contract include tunnels, pavements, bridges, roadside features (including curbs, gutters, sidewalks, and retaining walls), pedestrian bridges, roadside vegetation, and such traffic safety equipment as guardrails, barriers, impact attenuators, and signs. Also covered is snow and ice control. Roads throughout the city have been worked on, including Pennsylvania Avenue, I-295, and New York Avenue. The performance-based nature of the contract means that instead of specifying the materials or methods to be used, the desired outcome is outlined and it is then up to the contractor to achieve it. The contract is the largest transportation investment in DDOT's history and also represents the first time that FHWA has teamed directly with a city government on a program to preserve its highway infrastructure.

The evaluation compared the condition of the assets against the performance measures, providing an overall score and a score for each maintenance category. A score of 100 would mean that, on average, the condition of the assets meets the performance goal. The overall score for the first year of the contract was 92. "We're very pleased with the progress that's been made so far. The trends are going up in all categories," says Shannon Moody of VMS. "DC Streets has brought a lot of improvement to the NHS, although we still have a ways to go in realizing the complete goals of the initiative," says Edward A. Sheldahl of FHWA.

Reaction from the city has been positive also. "We've received a lot of feedback from residents and community members telling us that they think we're doing a good job," says Moody. The evaluation report noted that "the first year...showed a marked decrease in negative feedback from the public and press. Probably the most noted change was the lack of pothole complaints, which have plagued DDOT in years past."

"Contracting this work to VMS has brought wonderful results to our residential neighborhood and to the city as a whole," said Maria Tyler, Commissioner of the Foggy Bottom and West End Advisory Neighborhood Commission. Washington, DC, resident Jim Wheeler noted the "prompt and good work VMS and its subcontractors have performed in repairing street signs, removing abandoned meter posts, installing temporary sidewalk patches, and repairing tree boxes along Wisconsin Avenue and on sections of M Street in Georgetown."

One of the contract's goals is to use innovative methods and procedures for infrastructure maintenance. Innovative technologies used by VMS in the first year included a mobile spray pothole patcher. The contract also has the goal of revitalizing the communities where the maintenance is being performed. During the first year, VMS worked with local community development organizations, participated in community projects, and focused on hiring local residents and businesses.

Word of the success of DC Streets is spreading. Presentations on the project were made last year at the Transportation Research Board Annual Meeting, Mid Atlantic Quality Assurance Workshop, and the FHWA Eastern Area Engineering Conference. Project staff also met with delegations from Ireland, Northern Ireland, Finland, and the Southern Africa Development Community.

For more information on the DC Streets initiative, contact Luke DiPompo at DDOT, 202-654-6134 (fax: 202-645-6129), Michael Kirk at VMS, 804-553-4001 (email: mkirk@vmsom.com), or Edward A. Sheldahl at FHWA, 202-219-3514 (fax: 202-219-3545; email: edward.sheldahl@fhwa.dot.gov).

Roads in the LeDroit Park neighborhood of Washington, DC, are being spruced up under the new "DC Streets" initiative.

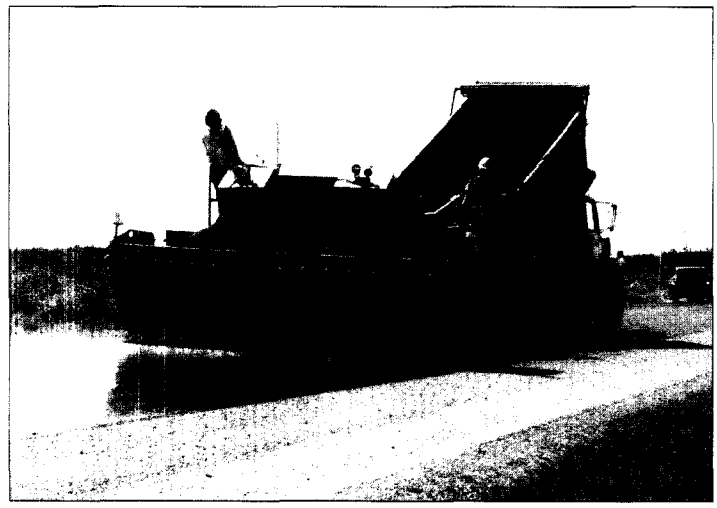
Midwestern States Partner to Preserve Pavements

avement Preventive Maintenance (PPM) is getting a Midwestern twist, as highway agencies, trade associations, and members of academia in the region unite to find new ways to apply PPM techniques to roads subject to the freezing weather conditions common in their States.

While transverse cracking, moisture-induced damage, and other cold climate pavement distresses occur to some degree in other parts of the United States, Midwestern States are particularly hard hit because of their climatic conditions. To address these common problems, highway agencies in the region formed a partnership last year to improve the technical aspects of PPM application in their States. PPM is defined as a planned strategy of applying cost-effective treatments to a structurally sound roadway to preserve the system and retard future deterioration.

The founding meeting of the Midwestern Pavement Preservation Partnership was hosted in Grand Rapids in April 2001 by the Michigan Department of Transportation (DOT). Participants came from Illinois, Indiana, Kansas, Michigan, Minnesota, Montana, Nebraska, Ohio, and Wisconsin to summarize the status of PPM in their respective States and share the techniques that work for them. The 60 attendees formed work groups and identified and ranked issues of importance to them in the areas of preservation policy, construction specifications, research, materials, and training. These high-priority issues include developing performance standards for preservation treatments, determining the proper timing of treatments, improving pavement performance predictions using mechanistic parameters, and implementing ongoing training for workers.

Enthusiasm for what the partnership will bring to States was voiced by participants. "I feel the pavement preservation partnership can become as beneficial to States in the future as the asphalt user-producer groups were during the implementation of Superpave," said Nebraska highway engineer Wayne Teten, whose own Department of Roads began formally implementing a preventive maintenance program in 2001.



One of the preventive maintenance treatments being championed by the new Midwestern Pavement Preservation Partnership is chip sealing, which is shown here.

"I feel the pavement preservation partnership can become as beneficial to States in the future as the asphalt user-producer groups were during the implementation of Superpave."

Some of the specific goals suggested for the partnership relate to the PPM techniques of microsurfacing and crack sealing. Although the process is becoming more popular among State highway agencies, microsurfacing specs vary from State to State. If the partnership, along with suppliers and contractors, is able to agree on a uniform standard, a more economical and consistent process could be developed. Similarly, with crack sealants, there are small variations among States in the application criteria, field performance criteria, and in the product itself. Having a uniform standard would yield a more cost-effective use of resources and lower bid prices for work, according to Federal Highway Administration (FHWA) pavement engineer Keith Herbold.

Another potential benefit resulting from the partnership's work, says Herbold, is that by broadening the exposure of members of academia to the practicalities of implementing a PPM program, universities will be able to better prepare the highway engineers of tomorrow.

Initial funding for the partnership's organizational work and first meeting came from FHWA's Midwestern Resource Center and the Foundation for Pavement Preservation. The partnership has proposed that subsequent funding come from State highway agencies, with in-kind support provided by vendors, consultants, and universities.

The partnership will hold its second meeting in Minneapolis from August 19–21. For more information on the partnership or to participate in its next meeting, contact Keith Herbold at FHWA, 708-283-3548 (email: keith.herbold@fhwa.dot.gov).

Pilot Projects Kick Off Traffic Data Pooled-Fund Study

oving forward with its traffic data State pooled-fund study, the Long-Term Pavement Performance (LTPP) program conducted five pilot studies in the summer and fall of 2001. The pilot projects focused on finalizing the pooled-fund study's technical requirements for field performance evaluation and installation activities and validating a set of protocols developed by the LTPP program.

The study is designed as a mechanism for highway agencies to improve the collection of monitored traffic data for five of the LTPP Specific Pavement Study (SPS) experiments. A 1998 review of the LTPP data concluded that the spatial distribution, timeliness, quantity, and quality of the monitored traffic data must be improved to ensure the success of the SPS-1, -2, -5, -6, and –8 experiments. It is estimated that at least half of these SPS sites do not have the quantity and quality of traffic data that is needed for analysis. Twenty-two of the 37 States with SPS-1, -2, -5, -6, and –8 sites have expressed interest in participating in the pooled-fund study. Use of 100 percent State Planning and Research funds for all of the study's activities has been authorized to promote participation by every highway agency.

The study protocols cover verification of scale performance; pavement smoothness requirements; model weigh-in-motion (WIM) system specifications, including accuracy requirements and construction guidelines; and data collection processing. The WIM system specifications are particularly important, as these sensors collect information on such factors as vehicle and axle weights. The quality of the WIM data is highly dependent upon the pavement in which the system is installed, as smoother pavements provide more accurate and less variable measurements. For highway agencies seeking to install WIM systems using the

A weigh-in-motion system is installed on I-40 near Flagstaff, Arizona.

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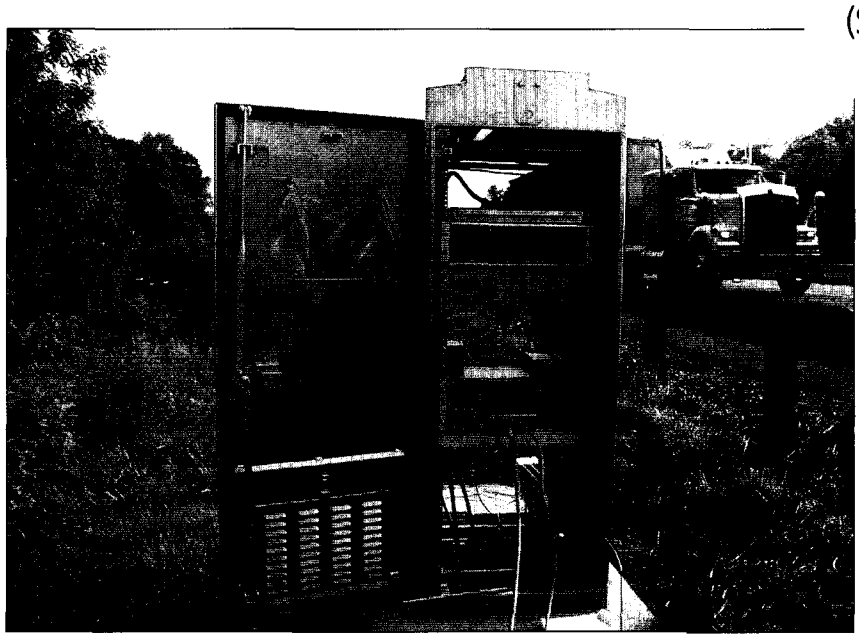
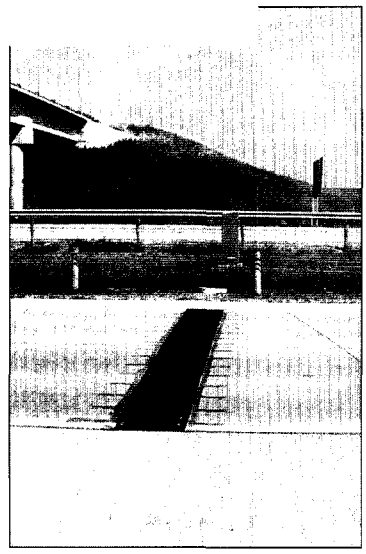


Displayed is weigh-in-motion equipment used for the Maryland pilot project on US 15 near Frederick.



This photo shows a typical bending plate weigh-in-motion system.

pooled-fund mechanism, it is key to have a smooth, durable, and well-maintained pavement in place before the WIM system is introduced. It is important that States proceed with constructing new pavement or rehabilitating existing pavement for the new WIM installations, as 5 years of data must be collected by 2009 for the study. This pavement construction is eligible to be covered by the pooled funds.

The five pilot studies, held in Arizona, Florida, Maryland, Michigan, and Texas, "were successful in demonstrating that the protocols were essentially correct as written," says Larry Wiser of the Federal Highway Administration (FHWA). The protocols' equipment performance specifications were shown to be achievable with current practice and technology and the recommended field practices, including speeds, temperatures, and vehicle condition, were validated. It was noted, however, that the smoothness specification was too restrictive for actual field conditions and it is now being revised. Study participants also noted that having well-trained drivers is essential to collecting quality data, as drivers of the test vehicles must travel at a constant target speed over the sensors and release their brakes when they are being weighed on the static scales. Also essential is having experienced traffic control workers on site during the data collection operations.

With the pilot field work concluded, the LTPP program will soon be issuing a request for proposals for a contractor to implement the pooled-fund study. Only those sites that have been assessed and shown to meet the performance requirements, regardless of which WIM system is used, will be included in the LTPP analysis.

For more information on the pooled-fund study, contact Larry Wiser at FHWA, 202-493-3079 (fax: 202-493-3161; email: larry.wiser@fhwa.dot.gov), or visit the LTPP Web site at www.tfhrc.gov/pavement/ltpp/spstraffic/index.htm.

FHWA Evaluates LRFD Software

In 1994, the American Association of State Highway and Transportation Officials (AASHTO) introduced a new set of standard bridge design specifications that incorporated the load and resistance factor design (LRFD) philosophy. This philosophy features the use of limit states, multiple load and resistance factors, and a more probabilistic determination of the structure's reliability. Along with the new LRFD specifications has come the need for compatible bridge design software. Recently, the Federal Highway Administration's Federal Lands Bridge office began to evaluate new software that is compatible with the LRFD specifications.

The Federal Lands Bridge office has evaluated SAP2000 and Conspan LA so far and will evaluate RC Pier, Florida Pier, CT Bridge, and Merlin Dash in the near future. SAP2000 is a three-dimensional finite element analysis tool that can be used for a range of structures, while Conspan LA is primarily used to design prestressed and precast members. Florida Pier, which was developed by the University of Florida, can be used for the design and analysis of bridge substructures and foundations. RC Pier can be employed to design substructures by utilizing strut and tie models; Merlin Dash, developed by the University of Maryland, is intended for steel bridge design. CT Bridge, developed by the California Department of Transportation, is to be used for modeling and designing post-tensioned box girders.

Along with the new LRFD specifications has come the need for compatible bridge design software.

The evaluation criteria includes:

- Does the software follow AASHTO LRFD code?
- What are the limitations of the software?
- Is the product user friendly?
- What future development plans exist for the software?
- What type of user or product support is available from the developer?
- What is the format of and how flexible are outputs?
- What will be the cost of future program upgrades and/or the correction of any software defects?

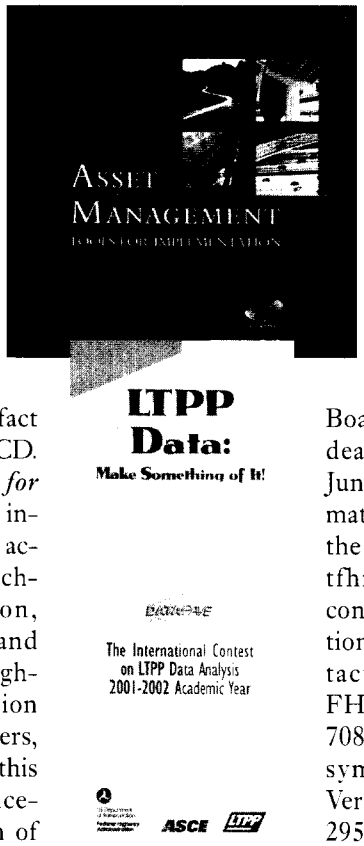
To date, the office has used SAP2000 and Conspan LA with varying degrees of complexity on several projects throughout the United States. Once the evaluations are complete, a team consisting of bridge designers from Federal Lands' offices in Denver, Colorado, and Sterling, Virginia, will make final recommendations to the Bridge Office Leadership Team as to which software programs should be adopted by Federal Lands.

For more information on the software evaluations, contact Hratch Pakhchanian at the Eastern Federal Lands office, 703-404-6246 (email: hratch.pakhchanian@fhwa.dot.gov).

In Brief . . .

The 2-day course, ***Pavement Preservation: Selecting Pavements for Preventive Maintenance*** (Course No. 131058), is currently available upon request from the Federal Highway Administration's (FHWA) National Highway Institute (NHI). The course focuses on selecting the right pavement for preservation treatments and evaluating the performance of these treatments under various field conditions. Field managers and practitioners from Government and industry can learn to identify pavement conditions that suggest whether preventive maintenance is appropriate; identify feasible treatments for the selected pavement; and select appropriate treatments based on consideration of life-cycle cost, improved performance, anticipated benefits, and other factors. For scheduling information, contact the NHI scheduler, 703-235-0528 (email: nhi.scheduler@fhwa.dot.gov). For technical information on the course, contact Julie Trunk at FHWA, 202-366-1557 (email: julie.trunk@fhwa.dot.gov). More information is also available at the NHI Web site (www.nhi.fhwa.dot.gov/131058.html).

NHI has recently updated the course ***Work Zone Traffic Control for Maintenance and Operations on Rural Highways*** (Course No. 380060) to conform with the *Manual on Uniform Traffic Control Devices* 2000 Millennium Edition. This 1-day course is designed to train State, county, and utility personnel to properly plan and operate traffic control measures for short term utility and maintenance areas. Students learn the proper use of traffic control devices, proper flagging procedures, and how to minimize the liability exposure for agencies performing utility and maintenance operations. For scheduling information, contact the NHI scheduler, 703-235-0528 (email: nhi.scheduler@fhwa.dot.gov). For more information, contact William Williams at FHWA, 703-235-0539 (email: bill.williams@fhwa.dot.gov).



You can now find many of FHWA's transportation asset management resources, including reports, software, presentations, publications, and fact sheets, on one easy-to-use CD. ***Asset Management: Tools for Implementation*** contains information on topics such as accelerated reconstruction techniques, data integration, pavement preservation, and life-cycle cost analysis. Highway managers, construction engineers, economic planners, and policy makers will find this CD helpful in the advancement and implementation of asset management principles. For more information, to request a copy of the CD, or to obtain printed versions of documents on the CD, contact Thomas Van in FHWA's Office of Asset Management, 202-366-1341 (fax: 202-366-9981; email: thomas.van@fhwa.dot.gov).

Act now before it's too late. Submissions are still being accepted for the third **International Contest on Long-Term Pavement Performance (LTPP) Data Analysis.** Sponsored by FHWA, in association with the American Society of Civil Engineers (ASCE), the contest is designed to encourage university students and professors from around the world to use the LTPP database for research, class projects, and Master's and Doctoral theses. Cash prizes will be awarded in four categories: Undergraduate Students, Graduate Students, Partnership (for students working with public or private organizations), and Curriculum (for professors who integrate the LTPP database into their class curriculum). Award winners will also be recognized at an ASCE meeting and the Transportation Research Board annual meeting. The deadline for submissions is June 1, 2002. For more information about the contest, visit the LTPP Web site at www.tfhrc.gov/pavement/ltpp/contest.htm. If you have questions about the contest, contact Monte Symons at FHWA, 708-283-3549 (fax: 708-283-3501; email: monte.symons@fhwa.dot.gov) or Verna Jameson at ASCE, 703-295-6199 (fax: 703-295-6132; email: vjameson@asce.org).

The transportation community recently suffered a loss with the death of **Dr. William (Bill) A. Phang.** Bill Phang served as the Principal Investigator for the LTPP program's North Atlantic Regional Coordination Office for 10 years, retiring in 1998. Prior to his work with the LTPP program, Phang spent 25 years with the Ontario Ministry of Transportation and had an 11-year stint with the Public Works Department of Guyana. He was a past chairman of the Transportation Research Board's (TRB) Committee on Monitoring, Evaluation, and Data Storage and had served on TRB's Committee on Flexible Pavements and Task Force on Weigh-in-Motion. He also received numerous awards for the more than 80 technical papers related to highway pavements that he authored.

Highway Technology Calendar

The following events provide opportunities to learn more about products and technologies for accelerating infrastructure innovations.

SMA in the USA Workshop
March 25–27, 2002, Frederick, MD

This workshop will provide the latest technical and performance updates on Stone Matrix Asphalt (SMA) pavements in the United States. The workshop is sponsored by the Federal Highway Administration (FHWA), Maryland State Highway Administration (SHA), Virginia Department of Transportation (DOT), Asphalt Pavement Alliance, International Society for Asphalt Pavements, and State asphalt pavement associations.

Contact: John Bukowski at FHWA, 202-366-1287 (email: john.bukowski @fhwa.dot.gov) or Gloria Burke at Maryland SHA, 800-477-7453 (email: gburke@sha.state.md.us).

Third International Symposium on 3D Finite Element for Pavement Analysis, Design, & Research
April 2–5, 2002, Amsterdam, The Netherlands

The symposium will highlight new worldwide developments in the use of the 3D finite element method for investigating pavement structural problems.

Contact: Samir N. Shoukry at West Virginia University, 304-293-3111, ext. 2367 (fax: 304-293-6689; email: samir.shoukry@mail.wvu.edu; Web: www.3dfem.org).

International Center for Aggregates Research (ICAR) 10th Annual Symposium
April 14–17, 2002, Baltimore, MD

The symposium will feature discussion on asphalt concrete, bases, and fines. The event is being cosponsored by the Aggregates Foundation for Technology, Research, and Education and the National Stone, Sand, and Gravel Association.

Contact: ICAR at 512-471-4498 (email: icar@mail.ce.utexas.edu; Web: www.ce.utexas.edu/org/icar).

Third National Seismic Conference and Workshop on Bridges and Highways
April 28–May 1, 2002, Portland, OR

The conference will highlight the latest research and developments in seismic engineering for bridges, highway systems, and components. The event is being sponsored by the Oregon DOT, Washington State DOT, and FHWA.

Contact: For registration information, contact Michael Higgins at Pure Technologies, 410-309-7050 (fax: 410-309-7051; email: mike.higgins@ soundprint.com). For information on conference content, contact Roland Nimis at FHWA, 415-744-2653 (fax: 415-744-2620; email: roland.nimis @fhwa.dot.gov).

Nineteenth Annual International Bridge Conference
June 10–12, 2002, Pittsburgh, PA

Current products, methods, and applications in the bridge industry will be discussed at the conference.

Contact: Engineers Society of Western Pennsylvania, 412-261-0710 (fax: 412-261-1606; email: conf@eswp.com).

First International Conference on Bridge Maintenance, Safety, and Management
July 14–17, 2002, Barcelona, Spain

Conference topics will include bridge management systems, high-performance materials, nondestructive testing, and composites. Sponsors of the event include the International Association for Bridge and Structural Engineering, University of Colorado at Boulder, Transportation Research Board, and FHWA.

Contact: International Center for Numerical Methods in Engineering, iabmas02@cimne.upc.es (Web: www.cimne.upc.es/congress/iabmas02).

Ninth International Conference on Asphalt Pavements
August 17–22, 2002, Copenhagen, Denmark

The conference will address the design, construction, maintenance, and performance of asphalt pavements.

Contact: DIS Congress Service Copenhagen A/S at isap2002@ discongress.com (Web: www.asphalt.org/calendar/ copenhagen2.html).

Seventh Annual Eastern Winter Road Maintenance Symposium and Equipment Expo
September 4–5, 2002, Charleston, WV

Symposium topics include the state-of-the-practice in anti-icing and new products and equipment for winter maintenance.

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Highway Technology Calendar,

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Contact: Deborah Vocke at FHWA, 410-962-3744 (fax: 401-962-3419; email: deborah.vocke@fhwa.dot.gov). Information is also available on the Web at www.easternsnowexpo.org/main.htm.

First International Conference on Scour of Foundations
November 17–20, 2002,
College Station, TX

The conference will cover such topics as bridge scour, erosion of soils, scour monitoring, numerical modeling, and international guidelines and practices.

Contact: Jean-Louis Briaud at Texas A&M University's Department of Civil Engineering, 979-845-3795 (fax: 979-845-6554; email: briaud@tamu.edu; Web: tti.tamu.edu/conferences/scour).

Second International Conference on Accelerated Pavement Testing
September 19–22, 2004, Minneapolis, MN

Attendees will be able to participate in both technical sessions and a variety of field trips. Conference sponsors include the University of Minnesota, Transportation Research Board, Minnesota DOT, Texas DOT, National Asphalt Pavement Association, American Association of State Highway and Transportation Officials, and FHWA.

Contact: Glenn Engstrom at the Minnesota DOT, 651-779-5531 (email: glenn.engstrom@dot.state.mn.us).

Check out FOCUS online at
www.tfhrc.gov/focus/focus.htm

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